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**Pai et al.**

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(54) **SYSTEM AND METHOD OF DETERMINING LOCATION OF WIRELESS COMMUNICATION DEVICES/PERSONS FOR CONTROLLING/ADJUSTING OPERATION OF DEVICES BASED ON THE LOCATION**

2006/0099971 A1\* 5/2006 Staton et al. .... 455/456.6  
2008/0181172 A1\* 7/2008 Angelhag et al. .... 370/328  
2008/0200182 A1\* 8/2008 Shim ..... 455/456.1  
2011/0202181 A1 8/2011 Lee et al.  
2011/0202185 A1 8/2011 Imes et al.  
2011/0231020 A1 9/2011 Ramachandran et al.

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**FOREIGN PATENT DOCUMENTS**

EP 1585078 A2 10/2005  
EP 2247126 A2 11/2010  
WO 2010/053362 A1 5/2010

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**OTHER PUBLICATIONS**

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European Search Report mailed Aug. 1, 2013 in EP 13171446, 7 pages.

\* cited by examiner

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(57) **ABSTRACT**

One or more relay servers can access first data received from one or more first devices (e.g., a phone, tablet computer, vehicle tracking device, or badge reader). The one or more relay servers can aggregate the data and infer a location of a person. The one or more relay servers can transmit second signals including second data to one or more second devices (e.g., lighting systems, security systems, garage-door openers, music controllers, climate controllers, or kitchen appliances), the second data being based at least in part on the estimated location. The second-signal transmission can be pushed to the second devices or pulled by the second devices. Operations of the second devices can be controlled at least in part on the second data.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

7,155,305 B2 12/2006 Hayes et al.  
2002/0147006 A1 10/2002 Coon et al.  
2006/0058039 A1\* 3/2006 Irvin et al. .... 455/456.1

**27 Claims, 8 Drawing Sheets**

